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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,386	04/04/2006	Takeshi Azami	Q92765	1026

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EXAMINER	
POLYANSKY, ALEXANDER	

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1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,386	AZAMI ET AL.	
	Examiner	Art Unit	
	ALEXANDER POLYANSKY	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-4,6,7,9-11,13 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-4,6,7,9-11,13 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 12, 2009 has been entered.

Status of Previous Rejections

The 35 U.S.C. 103(a) rejection of claim(s) 2 and 7 as being unpatentable over Iijima et al., has been withdrawn in view of the arguments and the amendment to claim 2 filed August 12, 2009.

The 35 U.S.C. 103(a) rejection of claims 3-4, and 6 as being unpatentable over Iijima et al., "Nano-aggregates of single-walled graphitic carbon nano-horns" in view of Makoto et al., JP 2000-249540 has been withdrawn in view of the withdrawal of 35 U.S.C. 103(a) rejection of claim(s) 2 and 7 and new rejection grounds applied in this office action.

Status of the Claims

Claims 2-4, 6-7, 9-11, 13-14 are pending. Claim 2 has been amended.

Examination on the Merits

Claims 2-4, 6-7, 9-11, 13-14 are presented for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iijima et al. "Nano-aggregates of single-walled graphitic carbon nano-horns" in view of Mineta et al., JP 60-194066.

Regarding claim 2, Iijima teaches a graphite target holding unit with a 50 mm long graphite target rod with a 30 mm diameter was located in the middle of the reaction chamber where the rod was rotated around its axis at 6 rpm, and advanced along its axis so that a fresh target surface was continually exposed to the laser beam while the rod was illuminated by the laser beam vertically at its cylinder-wall surface (page 166, first column, second paragraph), which meets the a target holding unit which has a contact surface being in contact with a surface of a cylindrical graphite target and movably holds the graphite target by frictional force generated between the contact surface and the surface of the graphite target.

Iijima does not explicitly state "frictional force," however, it would be obvious to one of ordinary skill in the art that since the rod was rotated around its' axis, as per Iijima, in both perpendicular and parallel directions some form of frictional force is required.

Iijima teaches a light source which irradiates on graphite target (page 166, first column, second paragraph) which meets the a light source which irradiates light to said surface of said graphite target at a substantially constant irradiating angle;

Iijima does not teach "substantially constant irradiating angle."

However, Mineta teaches an apparatus which can move the irradiated components while maintaining the irradiation angle of light constant (see fig. 4).

It would have been obvious to one of ordinary skill in the art to modify the laser irradiation apparatus of Iijima to make the angle of irradiation constant as disclosed in Mineta to be able to keep the irradiating unit steady while the graphite target is gradually ascended as it gets smaller and smaller, and further to keep a highly precise roll and perform precision based laser ablation (Mineta abstract and figs. 1-4).

Iijima teaches a movable unit as is readily apparent from the analysis above. Further, Iijima teaches the rod was rotated around its axis at 6 rpm, and advanced along its axis so that a fresh target surface was continually exposed to the laser beam while the rod was illuminated by the laser beam vertically at its cylinder-wall surface (page 166, first column, second paragraph) which meets the a moving unit which drives said target holding unit so as to move said graphite target held by said target holding unit relatively to said light source, to move an irradiation position of said light on said surface of said graphite target while maintaining the substantially constant irradiating angle, to rotate said graphite target around a central axis by the frictional force generated between said contact surface and said surface of said graphite target, and to move said graphite target in a direction parallel to and a direction perpendicular to a central axis of said graphite target

Iijima teaches a recovery unit to collect the nano-carbons obtained from the irradiation; and rotation of the target by frictional force (see abstract and experimental paragraphs 1-3).

With regard to the amended limitation the moving unit comprises separate movable parts to move the target holding unit in the perpendicular and parallel directions to the central axis of the graphite target, Iijima teaches that the rod was rotated around its axis (perpendicular) and advanced along its axis (parallel) (page 166, first column, second paragraph).

It would be obvious to one of ordinary skill in the art that to accomplish both rotational (perpendicular) and translational (parallel) motions at the same time the moving unit of Iijima would be expected to have separate movable parts.

Regarding claim 7, Iijima teaches a method of nano horn assembly by irradiating light (see abstract).

Claims 3-4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iijima et al., "Nano-aggregates of single-walled graphitic carbon nano-horns" in view of Mineta et al., JP 60-194066 and further in view of Makoto et al., JP 2000-249540 (machine translation).

Regarding claim 3, Iijima teaches the moving unit rotates the graphite target around its central axis by frictional force generated between the contact surface of the roller and the surface of the graphite target by rotating the roller around rotation axis as disclosed in the rejection of claim 2.

Iijima does not expressly teach the target holding unit has two "cylindrical rollers" which have a rotation axes substantially parallel to central axis of the graphite target.

However, in a process similar to Iijima, Makoto teaches a target holding unit that has two cylindrical rollers rotating in parallel with the target (claim 5), and the target rotates about its' axis by the force of friction generated between it and the rollers (par. 8 and fig. 2) which meets the recited limitations of claim 2.

It would have been obvious to one of ordinary skill in the art to modify the process of Iijima to incorporate the use of cylindrical rollers in view of the teaching of Makoto. The suggestion or motivation for doing so would have been to stabilize the graphite target; to rotate

that target along its' axis so as to maximize the surface area irradiation and to maximize the laser-to-surface contact and therefore maximizing the nano-carbon assembly yield within the holding unit (Makoto abstract and par. 8-12).

Regarding claim 4, Makoto teaches a device using friction force of contact surfaces to rotate components (par. 8, and fig. 2).

Further, as disclosed in the rejection of claim 3, Makoto teaches the claimed "the moving unit drives the target holding unit so that the irradiation position of the light irradiated to the surface of the graphite target covers over almost the entire area of the surface of the graphite target" (Makoto abstract and par. 8-12).

Regarding claim 6, Makoto teaches the rollers are comprised of hard metallic material (par. 10), which meets the claimed stainless steel limitation.

With respect to "alternatively a metal deposited with carbon on a surface," the examiner asserts that the phrase "alternatively" renders the limitation optional, and thus not necessary to be present in the prior art.

Claim Rejections - 35 USC § 103

Claims 9-11 and 13-14 are rejected under 35 U.S.C. 103(a) as obvious over Iijima et al. "Nano-aggregates of single-walled graphitic carbon nano-horns" in view of Mineta et al., JP 60-194066.

Regarding claims 9-11, Iijima teaches a method of nano horn (nano carbon) assembly comprising the following steps:

continually exposing a fresh target surface to the laser beam as the rod is rotated around its axis (pg. 166, col. 1, par. 2), which meets the irradiating light to a surface of a cylindrical

graphite target at a substantially constant irradiating angle while rotating said graphite target around a central axis;

recovering the plume with nano-carbon particles in it (par. 3 of the experimental, pg. 166), which meets recovering nano-carbon generated in said irradiating light,

illuminating the rod by the laser beam vertically at its cylinder-wall surface, while continually exposing a fresh target surface to the laser beam as the rod is rotated around its axis and advanced along its axis (pg. 166, col. 1, par. 2), which meets the irradiating light includes irradiating the light while holding the graphite target by a contact surface disposed in contact with the surface and while rotating the graphite target around the central axis by frictional force between the surface and the contact surface, and moving the graphite target in a direction parallel to and a direction perpendicular to the central axis, as claimed in claim 9, and the irradiating light to the surface of the graphite target, the light is irradiated so as to cover over almost the entire area of the surface of the graphite target while moving the irradiation position of the light, as claimed in claim 11.

Iijima does not teach "substantially constant irradiating angle."

Mineta teaches an apparatus which can move the irradiated components while maintaining the irradiation angle of light constant (see fig. 4).

It would have been obvious to one of ordinary skill in the art to modify the ablation apparatus of Iijima to make the angle of irradiation constant to be able to keep the irradiating unit steady while the graphite target is gradually ascended as it gets smaller and smaller, and further to keep a highly precise roll and perform precision based laser ablation would have been obvious at the time of the invention.

Further with regard to moving the graphite target in a direction parallel to and a direction perpendicular to the central axis, it would be obvious to one of ordinary skill in the art that the rod of Iijima which is rotated around its axis and advanced along its axis (pg. 166, col. 1, par. 2) would be moved parallel and perpendicular to the central axis.

Further with regard to contact surface is disposed in contact with a side surface of said graphite target of claim 10, it would be obvious to one of ordinary skill in the art that it is the "side" surface of the graphite rod that is in contact with contact surface, since the target is rotated by friction force between the rollers and the rod.

Further with regard to the irradiating light to the surface of the graphite target, the light is irradiated so as to cover over almost the entire area of the surface of the graphite target while moving the irradiation position of the light of claim 11, it would be obvious to one of ordinary skill in the art that the rod was illuminated by the laser beam covering the entire exposed surface of the cylinder wall because the rod was being rotated and advanced along one of its' axes, longitudinally, and not both.

Regarding claim 13, Iijima teaches the method limitations as recited in claim 9.

Iijima further teaches irradiating with a laser beam (pg. 166, col. 1, par. 2).

Regarding claim 14, Iijima teaches recovering carbon nano-horn assemblies (abstract).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re*

Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 2-4 and 6-7 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/555,064. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Regarding claim 2, claim 1 of the '064 application also recites a target holding unit, a light source, a moving unit, and a recovery or collecting unit. Further, '064 claims 2, 5 and 6 teach the amended features of (1) **at a substantially constant irradiating angle**; (2) **while maintaining the substantially constant irradiating angle**; and (3) **and to move said graphite target in a direction parallel to and a direction perpendicular to a central axis of said graphite target**,

Regarding claims 3, 4, 6, and 7, claims 2-8 of '064 teach the same sheet-like and rod-like holder as claimed, and it is the examiner's position that the structure would have necessarily fulfilled the limitations of claims 3, 4, 6, and 7 which require particular methods of operating the structure already claimed, such as an angle of irradiation as claimed in claim 2 and recited in claim 2 of '064. Furthermore, the roller configuration of Claim 3 of the instant application would have provided the claimed limitations of Claims 5 and 6 because a moving unit could be

operated to rotate between rollers or to reel out target material. Further regarding claim 7, the material produced does not materially affect the apparatus, but nevertheless it is submitted that the "assemblies" of Claim 7 of the instant application would be rendered obvious by the claimed "aggregates" in the copending claim 8.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed August 12, 2009 have been fully considered, but they are not persuasive.

Arguments are summarized as follows:

I. Applicants submit that none of Iijima, Mineta or Makato disclose separate moving units for moving the target holder in parallel and perpendicular directions as claimed in amended claim 2.

II. Applicants submit that none of Iijima, Mineta or Makato teach the limitation "irradiating light to a surface of a cylindrical graphite target at a substantially constant irradiating angle" in the present invention is achieved by moving the target in both perpendicular and parallel directions.

III. Applicants submit that Mineta fails to teach the use of "friction rollers." Therefore, even if the disclosure of Iijima is combined with the technical idea of Mineta, the combination still lacks motivation to employ friction rollers to move the graphite target for holding the graphite rod and rotating the graphite rod in a controlled and stable manner.

IV. Applicants submit that it would not have been obvious to a person of ordinary skill in the art to modify any of the inventions of Iijima, Mineta or Makato to arrive at the presently claimed invention.

Responses are summarized as follows:

I. The examiner's position regarding to the moving unit comprises separate movable parts to move the target holding unit in the perpendicular and parallel directions to the central axis of the graphite target, is as stated in the rejection above.

Furthermore, it would have been obvious to one of ordinary skill in the art that in concert movement of the moving unit perpendicularly and in parallel would have to be accomplished by separate movable parts.

II. The examiner's contends that since Iijima expressly teaches moving the rod in two directions (along its axis and while rotating) so that a fresh target area is continuously exposed to the laser beam is a clear indication that the angle of incidence is substantially constant.

Further, assuming *arguendo*, even if the applicants do not find Iijima teaching the constant irradiation angle, Mineta teaches constant angle.

III. The examiner notes that Mineta was used to show "constant irradiation angle" while Iijima teaches "friction rollers" as is disclosed in the rejection of claim 2.

Even if Mineta fails to teach "friction rollers," it is noted that the features upon which applicant relies (i.e., friction rollers) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

IV. The examiner's position regarding the obviousness rejections and analysis is as disclosed above.

It would be obvious to one of ordinary skill in the art to modify Iijima with either Makato or Mineta as disclosed above to meet all the claimed limitations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER POLYANSKY whose telephone number is (571)270-5904. The examiner can normally be reached on Monday-Friday, 8:00 a.m. EST - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ALEXANDER POLYANSKY/
Examiner, Art Unit 1793

/Roy King/
Supervisory Patent Examiner, Art Unit 1793